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ABSTRACT

One of a series of papers describing a collaborative educational change effort involving the Jefferson County, Colorado Public Schools, and the Texas Research and Development Center, this paper describes the design and implementation of a concerns-based staff development plan for the purpose of supporting the implementation of a revised science program for grades 3-6 in 80 elementary schools. (CS)

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THE DESIGN AND UTILIZATION OF A CONCERNS-BASED STAFF DEVELOPMENT PROGRAM FOR IMPLEMENTING A REVISED SCIENCE CURRICULUM IN EIGHTY ELEMENTARY SCHOOLS

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THE DESIGN AND UTILIZATION OF A CONCERNS-BASED STAFF DEVELOPMENT PROGRAM FOR IMPLEMENTING A REVISED SCIENCE CURRICULUM IN EIGHTY ELEMENTARY SCHOOLS[1]

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For the past three years the Jefferson County, Colorado Public Schools (Jeffco) and the Research and Development Center for Teacher Education at the University of Texas at Austin (UTR&D) have been jointly designing and carrying out a concerns-based staff development plan for the purpose of supporting the implementation of a revised science program for grades 3-6 in 80 elementary schools. Rarely have such distinctly different and geographically separated educational agencies joined forces on such an extensive project. The results have been mutually beneficial to both groups and are reported in a series of papers in this symposium (Loucks & Melle, 1980; Hall, Hord & Griffin, 1980; Pratt, Winters & George, 1980).

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[1]The research described herein was conducted under contract with the National Institute of Education. The opinions expressed are those of the authors and do not necessarily reflect the position or policy of the National Institute of Education, and no endorsement by the National Institute of Education should be inferred.

This paper describes both the revision of the elementary science program and how the two institutions collaborated on designing a staff development program for implementing the revision. The Concerns-Based Adoption Model (CBAM) was applied to facilitate the transition to the new science program. The basic assumptions of CBAM are outlined, then the ways in which the model was utilized are illustrated.

The Setting: Jefferson County Public Schools (Jeffco)

Jeffco was created in 1951 by the consolidation of 39 separate school districts, becoming the first district to reorganize under a new Colorado state law. Although the first years of the new district's life were rocky at best, a precedent for change and innovation was set as the district's norm. During the early years after reorganization a district-wide, uniform curriculum was established, in order to provide "glue" to connect and unify the various community and school differences.

A sample of innovations tried and implemented over the past twenty years serves as testimony to the district norm for change:

> A) Schools in the district have been national field test sites for NSF elementary (ESS) and secondary (BSCS, IPS, ESCP, PSSC) science curricula; for Man: A Course of Study social studies curriculum; and for the Wisconsin Research and Design reading program. The math department developed the Systematic Teaching Assessment and Measurement in Mathematics (STAMM) math curriculm, currently disseminated nationally through the National Diffusion Network. Although some have been revised to meet current educational needs, these programs are presently used as part of the district curriculum. Programs in outdoor education, arts in education, environmental education, and family living have also been locally developed and implemented, and serve as recognized models for other districts in the region and the nation.

B) School level innovations have also taken place. These include modular scheduling, open space and flexible space facilities, team teaching, departmentalized, multi-aged clases, and I.G.E.

C) Other innovations include year-round schools effecting 35% of the K-12 students, two district-owned outdoor lab schools where all sixth grade students spend one week, an open living school, and a fundamental alternative school.

In 1980, the district had approximately 80,000 students enrolled in 76 elementary schools, 19 junior high schools and 14 high schools including an occupational technical center. After 27 years of constant and sometimes rapid growth the student enrollment peaked in 1978-79 at 81,150. Four elementary schools and 1 junior high were closed in 1978 in the central, declining-enrollment area, while at the same time 3 new elementary and 2 new junior high schools were planned to open in 1980 in the growth areas of the district. The 1979 budgeted cost per pupil is $1,958, which is 9th out of the 15 Denver-metro area school districts in total expenditure per student.

A well-defined curriculum development process emerged in 1974 (Jefferson County Public Schools, 1974). This process includes: needs assessment, curriculum objective statements, curriculum writing, pilot testing-evaluation[2], field testing evaluation and district-wide implementation. The process involves central office curriculum personnel in getting approval and "buy-in"

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[2]The pilot test evaluation is carried out by a small number of highly qualified teachers who refine the materials and test them in "ideal" classrooms. The field test evaluation the following year is conducted in a relatively large number of randomly selected classrooms. The purpose of the field test is to determine the management problems that typical teachers encounter with the new materials in a wide variety of classroom settings.

from several groups. These groups include lay/professional curriculum councils, principal groups, the Superintendent and the Board of Education. The curriculum development process assures budget support and personnel time allocation for both development and initial implementation. Board approved procedures specify that a given amount of instructional time will be spent on each subject area.

Although the curriculum development process had been in place for several years, no companion process for implementation had been developed. The time period, depth of detail, style of inservice leaders, and follow-up in schools varied from department to department.

A district staff development office was created in 1974. One of its functions is assisting the curriculum departments in implementing programs. When the revised elementary science program reached the implementation phase of development at the completion of field test in 1976, the staff development office sought a model for implementation which might be adopted/adapted by the district.

The Innovation: A Revised Elementary Science Curriculum

The elementary science program in place prior to the revision had been implemented in 1969. At that time inservice was held in each school or group of schools as part of the implementation. The "hands-on" inquiry oriented curriculum, which required using no textbooks, consisted mainly of Elementary Science Studies (ESS) units, with the inclusion of some Science Curriculum Improvement Study (SCIS) and Mini-Mast units in the primary grades.

In successive years systems for organizing and replenishing materials within the schools were refined and continued inservices were offered and well attended. These inservices were held on a voluntary basis, which meant that many

teachers threatened by or disinterested in teaching science (the ones who needed it most) probably did not receive help. The number of teachers in this category was estimated to be significant. In addition, new teachers received little training from schools of education as facilitators in the inquiry method of teaching, had no personal experience in learning science in this mode, and were usually not strong in their science content background. In 1973, the revision of the elementary science curriculum was begun, based on the following needs:

1. New district goals and student outcome statements had been adopted to describe what the "Jeffco community thinks a graduate of our schools should look like, act like, and be prepared to do when he leaves high school," (Jefferson County Public Schools, 1974). The curriculum needed to be modified to meet these goals.

2. The original program was weak in the area of life science. Teacher observation and research (Whitla, 1973; BSCS, 1975) indicated that students were very interested in themselves and their physical, biological and social environment. With this knowledge the decision was made to strengthen the health and environment education areas of the curriculum.

3. The "back to basics" movement, with its strong emphasis on reading, mathematics and language arts, reduced the time and effort given to science in many schools. In order to promote better learning and maximize instructional time, specific application and reinforcement of identified basic skill objectives would be incorporated into science activities.

4. A more precise definition of expectations placed upon teachers and students was needed to help teachers better understand open-ended science activities. A set of performance objectives which clearly defined expectations of students, as well as processes of measuring and assessing student performance, was needed.

The program developers retained the most successful ESS units, added an adapted version of the SCIS life science strand, and wrote units around pieces from BSCS, ESS, and other sources for the health science. Locally written astronomy units integrated classwork with the district planetarium. Outdoor activities were added to the commercially produced ESS and SCIS units.

Objectives and assessments, as well as references to basic skill objectives, were produced for each unit. Today, the district guides, consisting of one notebook for each grade level, act as "roadmaps" through commercial guides from ESS and SCIS which outline activities the teachers are to use. These guides also show where teachers may supplement with outdoor activities, identify what media will reinforce the concept, suggest how to evaluate students, and include a complete set of worksheets.

The total program, grades 3-6, is delineated in four content strands: health, physical, environmental sciences, and earth science/astronomy. The curriculum is not written on a spiral basis, rather, each unit is discreet within itself. However, there is a continuity of the units within the health and environmental sciences strand. Figure 1 is a matrix of the curriculum, grades 3-6.

Figure 1

REVISED ELEMENTARY SCIENCE CURRICULUM CONTENT STRANDS

	Health Science	Physical Science	Environmental Science	Earth Science/ Astronomy
Gr. 3	Dental Health Your Senses	Structures	Populations Ice Cubes	What's Up There?
Gr. 4	Bones	Mystery Powders	Environments & Mealworms Crayfish	Rocks & Charts Operation Sky Watch
Gr. 5	Human Body Systems Reproductive System (a family living unit)	Batteries & Bulbs	Communities & Small Things	Space: The New Frontier
Gr. 6	Nervous System & Decision Making	Optics Kitchen Physics Gases & Airs (optional)	Ecosystems Ecosystems Supplement Microgardening (optional)	Tools of Astronomy

The curriculum for K-2 was not included in the 1977 science revision because the kingergarten material had been absorbed into an integrated-day-approach. The program developers are currently working with several other departments to integrate science, social studies, environmental education, health, and career education into a single guide for grades 1 and 2.

THE CHANGE MODEL: THE CONCERNS-BASED ADOPTION MODEL

As previously stated, the science revision had just successfully completed its field test in 1976, and implementation across the district had been tentatively planned. Jeffco personnel renewed acquaintances with researchers from the Research and Development Center for Teacher Education at the University of Texas at Austin where a model for change was under development. That model, whose underlying assumptions matched those of Jeffco staff developers and science department staff, became the framework for planning the implementation effort (Loucks & Pratt, 1979).

The Concerns-Based Adoption Model (CBAM) (Hall, Wallace & Dossett, 1973) views change as a process, not an event. Thus, it requires a long-range perspective for implementing any new program, along with a commitment for providing necessary time and resources. Furthermore, change is a highly personal experience that affects individuals differently; thus, a major part of the assistance must be targeted at the needs of the individual teacher rather than the school or district. Finally, individuals appear to follow a predictable pattern of growth in both their feelings about and their skills in using new programs, progressing as they become more familiar with and experienced in use.

When the Jeffco and Texas work crossed paths two dimensions of the CBAM had already been verified -- Stages of Concern About the Innovation and Levels of

Use of the Innovation -- and they both influenced the planned implementation. According to the research on concerns (Hall & Loucks, 1978), individuals who adopt new programs experience a progression in concerns, beginning with a need for general information about what the program is and how now they will be affected personally, then moving on to concerns about management and logistics, and finally to concerns about how the program is affecting students and how it can be improved. Figure 2 illustrates the seven Stages of Concern.

Figure 2

STAGES OF CONCERN:
TYPICAL EXPRESSIONS OF CONCERN ABOUT THE INNOVATION

STAGES OF CONCERN	EXPRESSIONS OF CONCERN
6 REFOCUSING	I HAVE SOME IDEAS ABOUT SOMETHING THAT WOULD WORK EVEN BETTER.
5 COLLABORATION	I AM CONCERNED ABOUT RELATING WHAT I AM DOING WITH WHAT OTHER INSTRUCTORS ARE DOING.
4 CONSEQUENCE	HOW IS MY USE AFFECTING KIDS?
3 MANAGEMENT	I SEEM TO BE SPENDING ALL MY TIME IN GETTING MATERIAL READY.
2 PERSONAL	HOW WILL USING IT AFFECT ME?
1 INFORMATIONAL	I WOULD LIKE TO KNOW MORE ABOUT IT.
0 AWARENESS	I AM NOT CONCERNED ABOUT IT (THE INNOVATION).

Since individuals are known to be motivated to learn that which concerns them most at a given point in time, the Jeffco science implementation was

planned to respond to the particular concerns of Jeffco teachers as they emerged. Previous research indicated that the concerns would change over time, so activities targeted at earlier concerns were planned earlier in the implementation. Later, over the course of more than a year, activities targeted at higher concerns were introduced. These are described later in the paper.

A second dimension of the CBAM, Levels of Use (Hall, Loucks, Rutherford, & Newlove, 1975), played a somewhat different role in implementation planning. The eight Levels of Use, defined in Figure 3, describe how the behaviors of individuals can change over time as they implement a new program. For the Jeffco implementation, Levels of Use functioned in goal setting. The goal decided upon during the planning phase was that each student in the district receive "hands-on" inquiry-oriented science instruction, and that each teacher be at a Routine (IVA) Level of Use. This decision influenced the target teacher population, the kind of support provided, and the structure of inservices. Had the goal been all teachers at a Mechanical (III) level, or most teachers at a Refinement (IVB) level or above, very different plans would have been made.

In addition to this "use" goal, it was determined beforehand that the implementation effort should result in low Informational, Personal and Management concerns (Stages 1-3) by the end of the implementation phase. It was hoped that resolving these would allow concerns about students (Stage 4) to dominate science instruction.

Figure 3

LEVELS OF USE OF THE INNOVATION:
TYPICAL BEHAVIORS

LEVEL OF USE	BEHAVIORAL INDICES OF LEVEL
VI RENEWAL	THE USER IS SEEKING MORE EFFECTIVE ALTERNATIVES TO THE ESTABLISHED USE OF THE INNOVATION.
V INTEGRATION	THE USER IS MAKING DELIBERATE EFFORTS TO COORDINATE WITH OTHERS IN USING THE INNOVATION.
IV-B REFINEMENT	THE USER IS MAKING CHANGES TO INCREASE OUTCOMES.
IV-A ROUTINE	THE USER IS MAKING FEW OR NO CHANGES AND HAS AN ESTABLISHED PATTERN OF USE.
III MECHANICAL USE	THE USER IS USING THE INNOVATION IN A POORLY COORDINATED MANNER AND IS MAKING USER-ORIENTED CHANGES.
II PREPARATION	THE USER IS PREPARING TO USE THE INNOVATION.
I ORIENTATION	THE USER IS SEEKING OUT INFORMATION ABOUT THE INNOVATION.
0 NON-USE	NO ACTION IS BEING TAKEN WITH RESPECT TO THE INNOVATION.

THE PRACTICE: THE USE OF CBAM STRATEGIES IN THE IMPLEMENTATION

When the collaboration between Jeffco and UTR&D began in the spring of 1976, the science program developers and the staff development office had just completed the initial plans for an extensive implementation inservice program to

be conducted over the next two years. One of the first activities of the two groups was to plan with and train 23 carefully selected elementary teachers who would serve as inservice leaders[3]. This took place at the University of Wyoming Science and Math Teaching Center and lasted a full week. With the assumptions of CBAM in mind, the leaders, together with the Jeffco and UTR&D staff reworked the inservice plans.

Assumption #1: Change is a Process--Not an Event

A process takes time. Too often the decision makers in a school system assume that change has occurred on the first day of the new school year if the new guides have been delivered, or if the new teaching pattern such as team teaching, has been outlined for the teachers. As long as the teachers involved in the change do not raise significant questions or problems, it is assumed that change has taken place. However, the Texas research indicates that from three to five years are necessary before the Level of Use of a complicated implementation begins to approach Routine (IVA), which was the long-range goal of the Jeffco science implementation. Before exposure to Texas work the Jeffco Science Department had scheduled a fairly typical three-day inservice activity for teachers, very near the beginning of the school year. That plan was changed to allow more time between sessions for teachers to use the presented units in their own classrooms. Since the inservice plan for any one school would now require almost a year to complete, the 80 elementary schools in the district were divided into three groups, or phases. Phase II and Phase III schools began their inservice program six months and one year after Phase I, respectively.

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[3]An additional eleven leaders were prepared at a similar session the following summer.

Another activity to extend the time in which teachers have to adjust to the change was planned. A series of two preinservice sessions were scheduled approximately two months before the inservice sessions were to begin. Approximately three months prior to that all principals of the schools involved were given a one-half day orientation to the revised program. Ways in which they could inform teachers of the change and support the change process itself were outlined. Even after the last inservice session was completed, contact with teachers was maintained through a planned series of "comfort and caring" visitations by two members of the science department to the classrooms involved. The "change process" was given two years instead of two weeks.

Assumption #2: Change is a Personal Experience

In anticipation of high Stage 1 and 2 concerns the inservice plan called for paying close attention to the individual teachers, who bear the ultimate responsibility in implementing the new program. Principals were given suggestions for personally supporting their teachers through scheduling procedures, provision of equipment and supplies, and simply providing time to discuss the innovation. The preinservice sessions were held in each of the local schools. The sessions were informal and included a small number of teachers so individual questions and concerns could be dealt with readily. Between each of the day-long inservice sessions two of the science staff members began the comfort and caring activities by helping teachers deal with problems they were encountering with the new program.

The inservice sessions themselves were designed so that teachers had choices of activities, depending upon the amount of science teaching experience and confidence they had with elementary science. Teacher to leader ratio was kept small in the inservice sessions, using as leaders trained, enthusiastic

classroom teachers who had already taught the new curriculum. These leaders could often anticipate, and more readily identify with, the problems and questions from the classroom teachers than could the program designers.

Assumption #3: Change Involves Growth in Feelings and Skills

As mentioned above, individuals go through stages in their concerns about an innovation. The pattern is predictable and implementation activities can be planned to match the development of the individuals involved. Because the Jeffco science implementation plan was designed with the Stages of Concern in mind, it is useful to review the chronology of the implementation plan according to the stages.

Stages 0 and 1: Awareness and Informational Concerns. Teachers and principals were informed by a memo from the science department in early spring that they would be involved in preinservice sessions late the next fall and inservice sessions starting in January the following year. They were told which units would be replaced or revised, what equipment would be provided each school, and given a recommended schedule by which they could phase out the old guide and teach the units in the new guide to correspond to the inservice schedule. After the principal orientation in August, teachers were informed again by their principal when they returned to school in September of the preinservice dates and inservice schedule.

Stages 1 and 2: Informational and Personal Concerns. The preinservice was specifically designed to introduce teachers to the reasons for the revision, a few details about the guide, and to inform them of the dates, location and organization of the total inservice plan. A slide tape show was used to orient them to the new program, guides were distributed to all teachers and a brief activity used to introduce its contents and format. A small, informal group

setting, allowed ample time for questions and answers about the entire program. In addition, teachers were reminded of the recommended teaching schedule that would be most useful to them if they wanted to coordiate their teaching with the content of the inservice sessions. At the inservice sessions Personal concerns were addressed by keeping class sizes small so that discussion could occur and by requesting written feedback at the end of each session. As mentioned earlier, Personal concerns were attended to throughout the entire implementation process by means of comfort and caring sessions in the local schools.

Stage 3: Management Concerns. The first inservice session paid particular attention to Management concerns. In an early part of the session specific classroom and equipment management techniques were explained and demonstrated to the teachers. The major portion of the day was spent by teachers actually doing the activities in the science units, with a strong emphasis on "how to do it" by the leaders. A portion of the inservice day was devoted to self-paced instructional modules. One of the modules from which teachers could select was designed to help with management techniques for caring for and maintaining live animals in the classroom, while another was devoted to procedures for conducting outdoor activities. Trained teachers as inservice leaders meant that answers to many questions were available from people with previous classroom experience in that unit. In the next two inservice sessions management technique helps were continued but to a somewhat lesser degree while concerns at higher levels were stressed more.

Stage 4: Consequence Concerns. As expected, the teachers at the inservice sessions varied considerably in their experience, confidence and Stage of Concern. To deal with these individual differences teachers were given a chance to self select the amount of time they spent actually doing a unit, giving them more time to deal with Management concerns. They were also allowed a choice

during the module sessions. If their concerns had progressed to a Consequence stage, modules on Piaget, question techniques such as "wait time," and the use or misuse of science vocabulary were available.

THREE YEARS LATER -- THE PROCESS GOES ON

The outcomes of the above concerns-based implementation plan have been very positive. Results have been reported on a district-wide perspective by Loucks and Melle (1980) and examined at the building level through a series of case studies by Hall, Hord and Griffin (1980). As a result of a heightened awareness created by the model itself, as well as concerns and use data, several new questions and issues have been raised:

1. Two years after the inservice program began most teachers had not reached Consequence concerns. Should they have? If so, how can Consequence concerns be promoted?

2. When Consequence concerns do arise, what type of workshop should be used to address them? Can they be addressed at the district level or is the local building a more appropriate setting? Is a workshop the most appropriate vehicle?

3. New teachers to the district create an ongoing need for the type of inservice and implementation activity described above. Teachers within the district changing assignments from school to school or changing grade level, often revert to a lower Stage of Concern and Level of Use. How much inservice or personal support is necessary to raise their Level of Use and Stage of Concern?

4. How does the principal affect the Stage of Concern or Level of Use of the teachers in his/her building? Do principals themselves have Stages of Concern that in turn affect those of their teachers? If so, how can these be dealt with by the district level change agents?

These questions and others have grown out of the initial implementation activities. Some answers are beginning to emerge and additional activities are being undertaken to resolve the new questions. Evidence from the mini-case studies indicates that the principal is a key figure in arousing concerns at the

Consequence stage. This evidence, together with the results of the program specific evaluation reported by Loucks and Melle (1980), have caused the program developers to begin focusing their attention at the local school level. Concentrated visits coupled with local inservice sessions have been directed at resolving mangement questions and arousing Consequence concerns. Science Department and other district inservice programs have begun to address these higher level needs with help in questioning skills, grouping students, and improving classroom environment. At the same time, inservice for new teachers, and inservice for new or revised curriculum by other departments are being designed with Stages of Concern and CBAM assumptions as a basic framework.

Finally, the authors of the symposium hope it is abundantly clear that the UTR&D/Jeffco collaboration has paid dividends for all involved. The researchers added more data in their process of building a better implementation model. The district staff and program developers learned how to build a better implementation/inservice program. The teachers are better prepared to teach science and, most of all, the kids will receive a better learning experience.

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